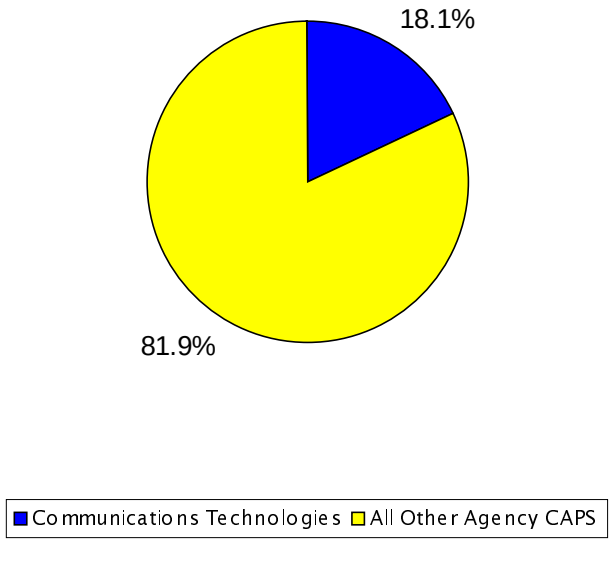
70-04-Communications Technologies

Fund/Agency: 001/70	Department of Information Technology
Personnel Services	$1,927,165
Operating Expenses	$13,339,769
Recovered Costs	($8,393,811)
Capital Equipment	$412,620
Total CAPS Cost:	**$7,285,743**
Federal Revenue	$0
State Revenue	$0
User Fee Revenue	$0
Other Revenue	$0
Total Revenue:	**$0**
Net CAPS Cost:	**$7,285,743**
Positions/SYE involved in the delivery of this CAPS	25/25



▶ CAPS Summary

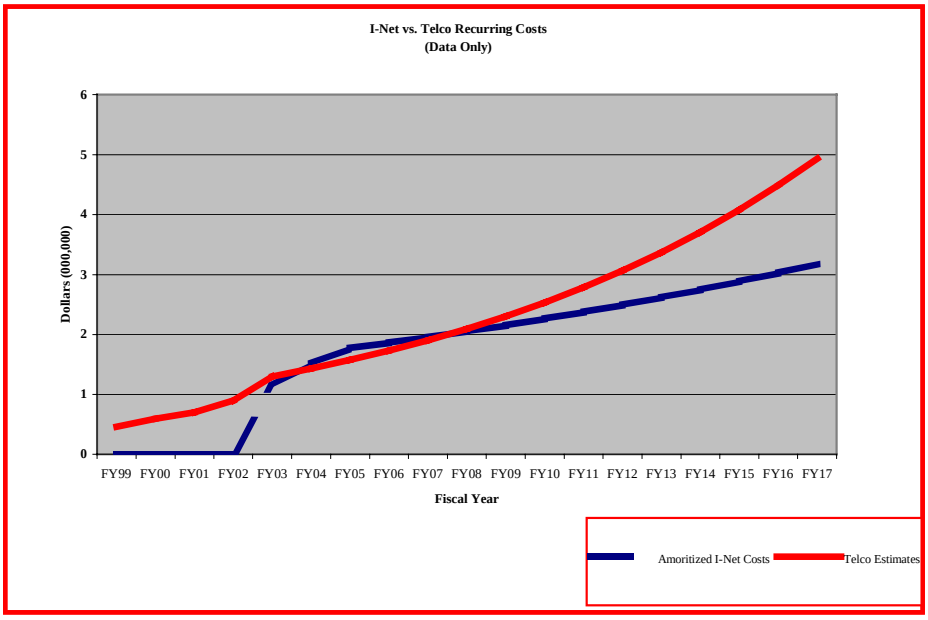
The Communications Technology Services CAPS in the Department of Information Technology (DIT) has the responsibility for planning, designing, implementing, and managing the County's communications network, providing County employees an effective voice and data communications system in supporting County government. Communications equipment, network, services and support are provided for all County agencies and independent authorities (with the exception of the Water Authority); over 400 agency locations are currently supported. In addition, this service and support extend beyond County locations to external networks, such as the Commonwealth of Virginia Department of Information Technology, State Government-to-County Government services, Public Safety, State Courts, ADVANTIS, VCIN, NCIC, Fairfax County Public Schools, the Internet, and various mandated Federal and State Human Service Programs and agencies.

Communication Services (voice and data) provides communication service and support to over 12,000 employees located at over 400 County facilities and office locations, including parks, firehouses, group homes, recreation facilities, police stations, SACC centers, health clinics, libraries, governmental centers, maintenance shops, etc. The primary staff for support of this technology is located at the Government Center. Staff is responsible for the design, planning, implementation, management and support of the voice and data communications networks on a 24 x 7 basis. This service includes coordinating the provision and maintenance of all electronic (voice and data) communications for Fairfax County government and related agencies; managing and maintaining all communications equipment and services; designing and implementing communication features and applications; planning and managing the installation of new communication equipment and services; evaluating emerging communications technologies for use in the County; providing countywide support of pagers and cell phones, and supporting the communications needs of critical County functions such as shelters, child care facilities, and the public safety agencies, including the Public Safety Communications Center and the E-911 system.

A recent addition to this group's responsibility is the planning, design, implementation and eventual maintenance and support of the County's new Institutional Network (I-Net). The I-Net is the foundation layer for all communications technologies. This fiber optic network will provide a cost-effective, reliable, and flexible infrastructure which will give the County to be able to adjust to its communications bandwidth requirement sans the 'phone company and associated contracts and service availability'. The I-Net will provide virtually "unlimited" bandwidth to meet the County's present and future communication network requirements. It will truly become the "super highway" for the County's internal video, voice and data communication network. The Fairfax County Public Schools is a partner with the County in this implementation.

Although similar bandwidth is available through local telephone companies (telco), it comes at a significant price, a loss of flexibility, and for some services, only limited availability. The I-Net's "unlimited" bandwidth, will allow the County to amortize its cost over the life of the I-Net with an overall cost savings. From a financial comparison, the I-Net when amortized over the 15-year life cycle of the franchise makes good business sense. Below is a comparison of data communications cost (excluding voice and video). If voice communication costs were factored into this analysis, substantial savings could be realized with the elimination of the internal telco provided services now required for agency-to-agency and building-to-building communications. As such, the following list of factors incorporated into the methodology represents a very conservative view:

- Only data communications are considered;
- The I-Net is amortized over the life of the franchise (15 years);
- Maintenance and replacement equipment costs are not included, since they would be required regardless of I-Net installation or continuance of telco service; and
- Telco rate increases after FY 2002 are based on a very conservative 10 percent growth rate. I-NET costs beginning in FY 2003 are inflated by adding 30 percent of telco costs based on the assumption that some telco circuits would still be required to maintain backup circuits for high priority sites, such as Public Safety, Fire and Rescue, and some small Human Services sites.



Accomplishments

Over the past few years several initiatives have been undertaken by the County's Communication Group, some were in preparation for the I-Net's arrival, while others were to take advantage of technology advancements to improve reliability and increase the speed and capacity of the network infrastructure. In that timeframe, the County's network has been converted from the older Token Ring technology to Ethernet which increased both capacity and speed of the Local Area Network (LAN); the Government Center Campus has been upgraded increasing capacity 10 fold while adding full LAN redundancy; all limited-function equipment has been replaced with intelligent equipment which permits remote manageability, thereby reducing travel time to repair network outages; a new remote access security system and Enterprise firewall has been installed to beef-up our network security and protect against unauthorized network intrusion; and Network Management systems have been installed to provide an ability to monitor the Local and Wide Area Network. Additionally, in support of existing and planned e-government initiatives, the County's connection to its Internet Service Provider (ISP) has been expanded offering a ***25-fold*** increase in capacity and speed. This change will enable both employees and County citizens to more quickly access County data and meet the requirements of new Web-enabled applications. The redesigned County's Web pages reflect the desire to provide our constituency a value-added approach to acquiring County information through an easier and more intuitive approach by using a functional rather than departmental view of information. Several new countywide e-government initiatives will lead to increased citizen and employee accessibility of County information via the Internet. To provide our employees additional capability, we have commenced a multi-year project to re-cable the Government Center Campus. The new cable will provide additional capacity and speed which will permit County employees full desktop support of integrated voice, video, and data, allowing for new technologies, such as streaming video, video teleconferencing, IPTV, unified messaging, etc.

The above network enhancements have significantly improved access to County critical information, resulting in the following:

- Reduced operational and maintenance costs by installing new communication equipment thereby increasing availability of replacement parts, when components fail;

- Improved reliability and increased capacity to support ongoing and future application while providing a faster flow of information between County agencies;

- Improved service levels to the public by empowering County employees with the technology to more expeditiously extract information to fulfill County citizen requests;

- Increased public satisfaction with government services and the attractiveness of Fairfax County to prospective businesses and residents by more quickly responding to constituent inquiries or business transactions saving valuable private and corporate resources; and

- Reduced staff time permitting redeployment of staff to higher value-added issues, i.e., increasing number of customers serviced and/or providing improved services at a lower cost to County citizens.

Future Initiatives

In recognition of the changes taking place in the voice and data communications environment, the management and structure of the voice and data branches of the Technology Infrastructure Division have been converged into a single County voice and data communication service. The team is undertaking an expansive telecommunications study which will provide a strategic plan for deployment of telecommunications technology, investment decisions, and service provisioning methodology of the CAPS for the future.

Initiatives planned for FY 2002 and FY 2003 will include pilots and full implementation of technologies such as Voice over IP (VoIP), Virtual Private Networks (VPN), wireless LANs, reconfiguration of the network to Natural Address Translation (NAT), proxy servers, teleconferencing and full motion video, etc. Each of these technologies will require significant effort from our new Communications Group, but successes in these technologies will provide significant benefits to the County.

Voice over IP (VoIP) will result in significant increases in capability while reducing overall network costs through the utilization of a single network cable and network appliance to provide voice, data and video services to the client. VoIP reduces not only initial implementation costs but reduces overall maintenance and support costs. Having only a single cable and one type of equipment reduces our spare parts inventory, and minimizes the diagnosis of problems or outages. However, VoIP may require an increase in the skill set of the network technician. Now, instead of being proficient in one technology, the technician must have an understanding of all three technologies to properly implement and service this network environment.

Virtual Private Networks (VPN) is another initiative, which will result in a significant advantage to the County by increasing the security of the data transmitted, providing easier access by employees, and reducing overall network costs. Since VPNs use the public Internet to securely connect remote offices and remote employees at a fraction of the cost of dedicated, private telephone lines the County could eliminate the need for the racks of modems required for remote access. And since most users will have local access to their ISP, elimination of the County's long distance or 800 service for data access is anticipated. One of the biggest advantageous of VPNs however, is that VPNs permit access to protected network resources by only authorized users and through the use of highly sophisticated encryption techniques.

Recent improvements in the transmission characteristics and capacity of wireless technology, make it more readily acceptable for inclusion in the County's inventory of network technologies. Wireless LANs redefine the way we view LANs. Connectivity no longer implies attachment. Local areas are measured not in feet or meters, but miles or kilometers. An infrastructure need not be buried in the ground or hidden behind the walls - an "infrastructure" can move and change at the speed of the organization. With this in mind, there are many locations where this technology makes sense to Fairfax County, i.e., Board Auditorium, Conference Rooms, training rooms, other general use areas, and even more importantly, in on-site emergency events, such as command posts for Public Safety Emergency Response Teams. The ability to send and receive critical information in times of catastrophic emergencies is vital.

Natural Address Translation (NAT) and the use of proxy services provide increased security for the County's network. NAT is a re-addressing scheme, which allows only a single IP address to be seen outside the County's internal network. This reduces the possibility of a user determining the IP address of a specific device, i.e., PC, router, switch, etc. and thereby compromising access to the network. Proxy servers provide two advantages, increased security and increased Internet speed. Proxy servers are devices, which store copies of the County's public data, as well as received static Web pages. Users never "touch" the live data stored behind the firewall on the internal Network. The user thereby retrieves the data quicker, a "cyber" hacker can only corrupt this copy of the data, not the real protected data, and the County can quickly restore the data by simply providing a new copy from the protected database.

Another major initiative planned for FY 2002, is the development of a Telecommunications Master Plan. A contract has been awarded for a Telecommunications Study to provide this Telecommunications Master Plan, which will include both tactical and strategic plans pointing the direction for the County to follow in its telecommunications strategies for the next decade.

▶ Method of Service Provision

The work of the communications technologies group is accomplished by County staff who apply management, design, installation, monitoring, maintenance and support techniques common to information technology installation. The staff in this CAPS has specialized expertise in deploying an effective, efficient, cost-justified, maintainable and reliable enterprise-wide voice and data communications network. Previously, these two sub-groups, data and voice, performed these functions under two different philosophies and infrastructures. The data group provided this support through minimal use of outside contractors and performed most of the effort through the use of in-house resources. The voice group provided service through contracted services. The staff coordinated with agencies and vendors to determine communication requirements and design solutions. The outside contractors under staff supervision did most of the actual work. Both the I-Net implementation and other initiatives planned will assist the consolidation of these support methodologies. Full economies will be realized as staff is cross trained in the technologies, and as the services are migrated to the I-Net backbone.

▶ Performance/Workload Related Data

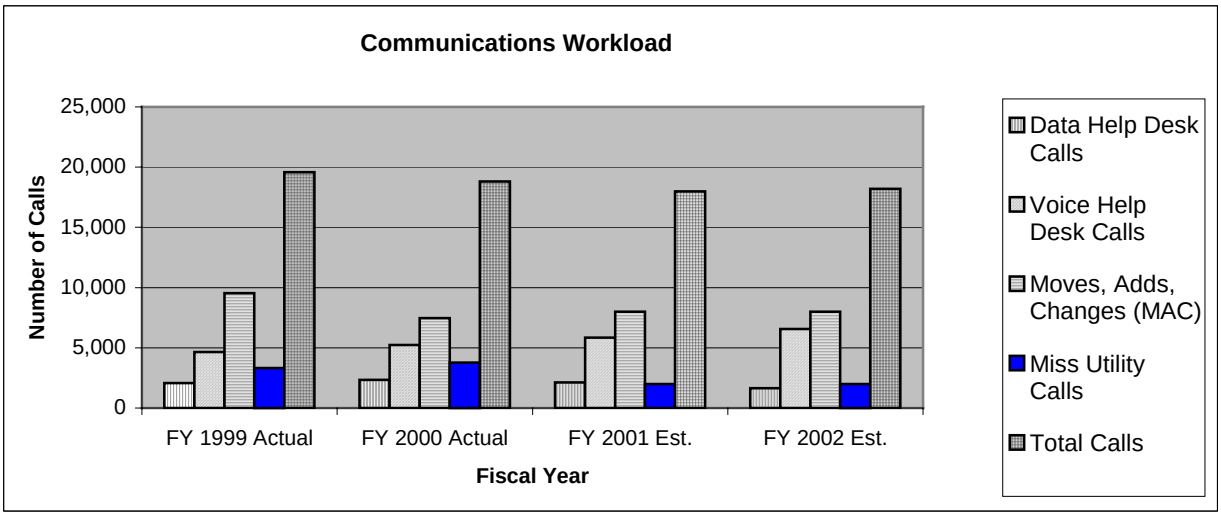
The County's voice and data networks continues to grow, in terms of cost, sophistication, and increased demand on our Communication staff. The Communication Group now supports over 12,500 data ports and over 15,000 voice ports. Additionally, initiatives already in place and those planned, as described above, have resulted in many significant changes with many more occurring in the future. Gartner Group, a recognized consultant in IT research and investigation, and others now document that network technologies refresh, on an average, every 18-24 months. This will provide added strain on County fiscal and staff resources, as the County tries to maintain network currency. Adding to this situation is that County agencies continue to add or expand programs, which in turn require new or expanded network resources to provide both intra and inter County links. The Internet and Web-enabled applications have rapidly expanded requiring expansion of our ISP connection from a single T1 to a high capacity DS3 (a capacity equivalent to approximately 31 T1s). Future initiatives and technologies, such as streaming video, video and teleconferencing, more integrated and complex applications will outpace existing communication infrastructures unless those infrastructures are continually updated and enhanced. The vision of the County's Communication Group is to provide a network that is totally transparent to the user and the user's application and allow for the seamless flow of voice, data, and video information. The County, to maintain its viability and reputation as a leader in technology, as well as meeting the needs of its employees and clients, must maintain currency of its voice, video and data networks.

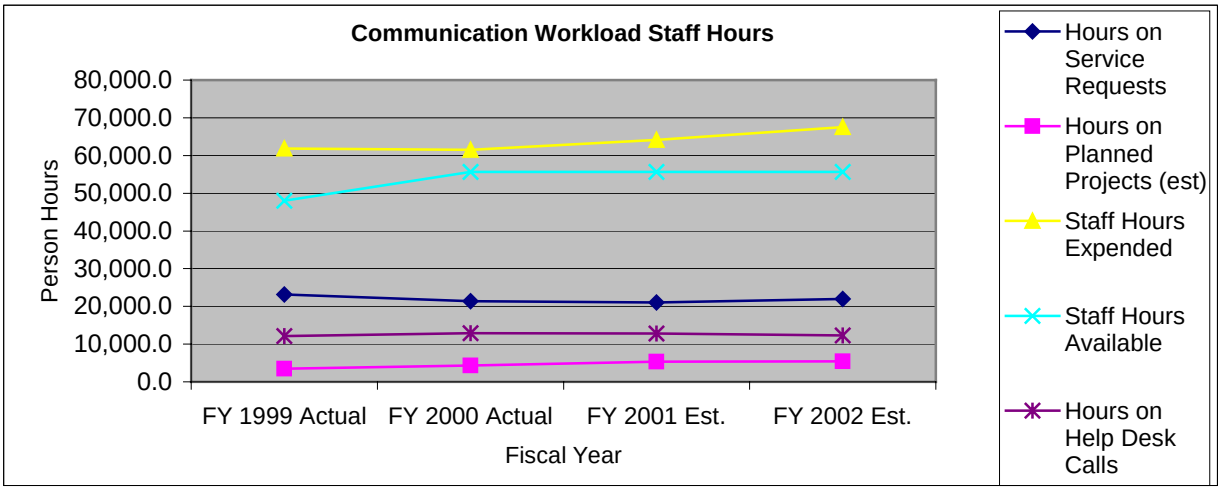
Staff workload in planning, developing, and implementing new technologies to maintain this currency is exacerbated by the day-to-day requests for assistance from our user community. The charts and graphs below describe some of the effort needed to meet these day-to-day operations. Although this staff supports over 95 LANS and has seen network capacity increase over 300 percent and the number of LAN connections increase by 30 percent, one of the distinguishing observations is the reduction in the number of help calls during the past year. Although conclusive data is rather limited, it is our analysis that this reduction is a result of the Ethernet conversion, which replaced all the aging Token Ring equipment with new redundant and fault tolerant Ethernet equipment. As new equipment is put in place and the existing cabling plant is replaced with newer higher capacity cable and fiber, calls for assistance should continue to decrease. Unfortunately, in the voice communication field we are seeing just the opposite result. The County is still using many older PBX and Centrex systems that have met or surpassed their expected life expectancy. Continued use of these systems requires more and more daily "care and feeding" and results in additional calls for assistance from our user community. Additionally, these older systems reduce the County's ability to move forward into new areas of communication technologies. One of the first priorities for the Telecommunications Study consultant will be to identify these systems and provide immediate recommendations as to their status and replacements.

Title	FY 1998 Actual [1]	FY 1999 Actual	FY 2000 Actual	FY 2001 Estimate	FY 2002 Estimate
Data Help Desk Calls	N/A	2,074	2,345	2,130	1,650
Voice Help Desk Call	N/A	4,645	5,230	5,858	6,561
Moves, Adds, Changes (MAC)	N/A	9,525	7,463	8,000	8,000
Miss Utility Calls	N/A	3,327	3,780	2,000	2,000
Total Calls	N/A	19,571	18,818	17,988	18,211
Hrs. on Help Desk Calls	N/A	12,094.2	12,877.5	12,780	12,316.5
Hrs. on Service Requests	N/A	23,133.6	21,361.7	21,000.0	22,000.0
Hrs. on Planned Projects	N/A	3,456	4,350	5,355	5,450
Staff Hours Expended	N/A	61,817.4	61,465.9	64,129.8	67,514
Staff Hours Budgeted	N/A	48,000	55,680	55,680	55,680

[1] Data is unavailable for FY 1998.

Communication Technologies





A recent Total Cost of Ownership (TCO) study conducted by Gartner Group pointed out that although the County was receiving an outstanding cost benefit result from its existing Communications staff, who not only handles problems effectively but at a cost well below industry standards, staff should be spending more time in the area of communication vision and planning. It should be noted in the above diagrams, that as the County replaces aging equipment with newer, more fault tolerant and redundant equipment, calls for assistance and repairs should continue to diminish. This increase in available time should permit staff to concentrate on the administration, monitoring and planning of the technology and better meet the needs of our constituent users.

Although neither voice nor data communications networks are directly mandated by Federal or State regulations, many of the applications and program offerings of the County are mandated. Many of these mandated programs have monetary penalties prescribed should mandated timeframes for service not be met. The voice and data network provides the mechanism and structure to assist County agencies to meet those mandates. A perfect example of these mandates is the new Food Stamp program. This new program will phase out the old paper food stamps and replace with plastic debit cards. Jurisdictions must have in place the requisite communication network to permit the electronic use of these cards. This will involve specialized equipment at County locations for distribution and receipt of cards and for maintaining communications to State and private databases on the use of these cards. All of this must be provided within a stable and secure network infrastructure. Fairfax County will pilot this new program in the Fall of 2001 with full implementation in early Spring of 2002. Additional mandated programs, such as the new HIPAA rules and regulations will place added burdens on the County network for security and safe guard of personal data, its storage, and accessibility.